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PUBLICATIONS

OF THE

AMERICAN ECONOMIC ASSOCIATION.

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Contributions to the Wages Question.

I.

THEORY OF WAGES.

BY STUART WOOD, PH. D.

II.

POSSIBILITY OF A SCIENTIFIC LAW OF WAGES.

BY J. B. CLARK, A. M.

AMERICAN ECONOMIC ASSOCIATION.

March, 1889.

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THEORY OF WAGES.

BY

STUART WOOD, PH. D.

THE THEORY OF WAGES.[1]

BY STUART WOOD, PH. D.

I.

Little over a century has elapsed since the study of Political Economy acquired something of scientific shape at the hands of Adam Smith. In that time its teachings have exerted a widespread influence in many directions, and some of them have obtained an acceptance scarcely less unanimous than that accorded to the best established truths of the physical sciences. In other directions its doctrines have made their influence little felt, and have, in spite of the sincerity and the earnestness with which they have been preached, failed hitherto to carry persuasion to those whom they most closely concern.

Especially is this true of the theory of wages. A few decades ago the wages fund theory was generally received by economists as a final solution of the question. For many years it held the field without a rival. Never, however, was it generally accepted by the laborers, who are the very people who have for sale the article whose price it was supposed to fix; and to-day while by many economists it is, with one modification or another, still cherished, it is by a very influential portion of the

[1]Paper read at Third Annual Meeting of the American Economic Association, in Philadelphia, December 27, 1888.

younger and more progressive spirits absolutely rejected. No new theory however has taken its place among the established principles of the science, and the greatest differences of opinion exist even between writers of acknowledged authority. If this be true of the teachings of Political Ecomomy on a matter of such supreme interest, is it surprising that a science speaking with so uncertain a voice should fall into disrepute, and that its precepts should often go unheeded?

It is not to be supposed that the clearest and most convincing exposition of scientific truth would entirely allay the elements of social strife. Yet no careful observer of human affairs will deny the great influence of theory upon conduct. That in just such subjects as the present its force may be very great, is abundantly shown by the history of modern Socialism and of its allied movements, as evidenced by the currency of such writings as those of Karl Marx, and Henry George. Is it then too much to hope that the discovery and acceptance of a true theory of wages would go far to aid in a practical solution of labor troubles, and might serve in some measure to calm the fruitless struggle between labor and capital, and to direct the energies thus wasted into channels where they would add to the productiveness of industry and to the common welfare of all classes,—of those, alike, which receive, and of those which pay wages?

There are really two wages questions. There is, to use the language of Mr. Ricardo, a natural price of labor, and there is a market price of labor. The

first is the rate which would in the long run prevail, if the influence of price upon supply had time and opportunity to take effect without the intervention of disturbing causes. The principles which regulate the natural price are commonly treated separately, and form a large part in discussions of the theory of populatio.n When the law of wages simply is spoken of, there is usually a tacit intention to refer not to natural but to market wages. On the present occasion at least, it is to the law of market wages that I shall ask your attention. The necessity of establishing such a law is obvious, and will be readily acknowledged, in view of the length of time needed for any of the causes which influence population or the supply of labor to produce their effect upon price.

II.

The market price of labor is that price which prevails at any given time in virtue of the existing supply and demand. Now at any given time the supply of labor is a fixed quantity. A change of price will not cause it to vary. But price can only be in equilibrium on the condition that supply and demand are equal; and where these are not equal, equilibrium can only be reached by the action of price upon one or the other of them. As it cannot, in this instance, act upon supply, it must, if it acts at all, act upon demand. In the case of everything else which is bought and sold, it is acknowledged that the demand varies under the influence of price. No one will question that, other things being equal, people will be better clad if coats

are cheap; and that if houses are cheap, people will be better lodged. Certainly no one would deny that the demand for steam engines and for horses varies with their prices; and if this be true of the labor of beasts and of inanimate machines, what can prevent that it should be equally true of the labor of men? Human labor, indeed, consists only in moving objects where they are wanted, the very thing that is accomplished by the labor of horses and of locomotive engines.[1]

Labor is generally disagreeable to perform. But that is no reason for buying it. That gives it no exchange value. The source of value must lie somewhere else. Indeed were labor pleasant instead of irksome, those who have it for sale would scarcely abate a jot of the price. People buy labor for one of two reasons. The first reason is that it can perform agreeable services which they enjoy receiving. When so employed, it is often called unproductive, because it is not embodied in any material commodity. The only other reason for buying labor is in order to create wealth, and this end is accomplished whenever by its services it confers upon some material object a value greater than the price which is paid to it for doing so. Labor so sunk or fixed in material objects is said to be productive. But such objects are themselves destined to be used like unproductive labor, in gratifying human desires.

No labor will be sold unless it pays somebody to buy it. Rather than abandon its use the buyer would prefer to pay for each particular act of

[1] As an illustration of this, Dr. Patton suggests to me that it has been recently stated in the *Seminar* of the Wharton School, that in certain mining and manufacturing towns in Pennsylvania the demand for Hungarians depends upon the price of mules.

labor, a sum in proportion to its real utility to himself. But it does not follow that he must always pay so much as this. Nor does it follow that labor as a whole is paid the full price which employers could afford to give rather than dispense with it entirely. The price of all labor is regulated, as are the prices of all commodities, by its final utility; by the utility, that is, of the portion which comes into use last; that portion, in short, whose services are least useful and least highly valued.

What then is the measure of the final utility of labor? How much will men pay for the least useful or least productive portion of labor? Or in what other directions could they expend with equal satisfaction the sums now devoted to its purchase? The first portion of labor used has immense utility; it is, in fact, indispensable; the next portion, and the next, may also be well nigh indispensable; but subsequent ones are not; and each succeeding portion can be more easily and cheaply dispensed with than the last, while industry goes on, and labor's services are replaced by other productive agents in the shape of auxiliary capital. It may be that exactly the same thing which was formerly done by labor will now be done by a machine; or that some other change will be made in the organization of industry, whereby larger sums of capital shall be united in production with smaller amounts of labor. Or again it may happen that the substitution of capital for labor is brought about by a change in the direction of consumption. Whether labor is used or capital, depends in each case upon the relative hire which must be paid for them. The final utility of labor will be found in those of its actual employments where it has the least advantage

over the use of auxiliary capital. Let us examine more closely where this point is to be found.

There are two ways in which the demand for labor can be diverted into other channels. One is in production, whose methods are decided by the desire of producers to obtain every object with the least possible outlay. The other way is through the influence of unproductive consumption, whose objects are liable to vary according to their prices, because people desire to employ their means in such manner as to obtain the greatest possible gratification.

If any one, who hires labor and uses it unproductively, should find a way to obtain a greater satisfaction by some other form of expenditure, he will change to it. If, for example, some one who hires a gardener at five hundred dollars a year were to discover that the same sum would furnish him with something else which would give him more pleasure, he would discharge his gardener and buy the other thing. The demand for labor would be lessened, but by how much it would be lessened would depend upon the application which he might make of the money saved. If he were to buy fresh vegetables, the greater part of the sum would still go to pay for labor, while a small part only would go to pay interest on capital. If he were to buy coarse cotton goods, less would go to wages and more would go to interest than in the case of vegetables. If he were to buy cutlery, a still larger part would probably go to interest and a smaller amount would go to wages than in the case of coarse cotton goods. If, again, he were to buy tea, he would occasion a demand for whatever commodities we export to China, to pay for

the tea that comes from thence. If we pay for our Chinese imports in grain, a small part of what went formerly to wages would go now to interest, while if we pay in cotton goods or cutlery, a larger part would go to interest.

A similar result occurs whenever unproductive expenditure changes from articles like green vegetables, whose price consists mostly in wages, to other articles like cotton cloth or copper, where price consists more largely of interest or rent. All articles are produced by the coöperation of labor and of capital, but it may be that no two articles are produced by exactly the same proportions of them. As consumption happens to be of those articles into whose production labor enters more largely, or of those other articles into whose production the use of capital enters more largely, just in such proportion does it occasion a large or a small demand for labor.

Not only do industries which produce different articles involve the use of different proportions of labor and of capital, but the very same articles also may often be produced by different methods which involve the use of different proportions of labor and of capital. Very many things which are now done by the use of capital could be done by labor, and many things which are now done by labor could be done equally well by the use of capital. If one or other of them is used exclusively in any case, this is not because it alone can accomplish the desired purpose, but because it can do so more cheaply than the other. Where railroads are established, they certainly in most cases carry goods more cheaply by far than porters or pack animals can do. Yet there are some countries where carriers and

asses compete successfully with existing railroads, and there are others where these primitive means of conveyance are yet undisturbed by the competition of the steam engine and the iron road. So also power looms and nail machines have generally supplanted hand looms and hand made nails; but under some circumstances hand methods are, or were recently, more economical in these trades.

This competition of capital with labor is not confined to the case of machinery. It exists wherever there is a question as to the length of time over which a productive operation shall be prolonged; for every such prolongation involves the accumulation and retention of greater stocks of material, as in the cases of aging wine, seasoning lumber, and curing leather. The same competition exists wherever there is a question of erecting costly buildings which save labor, or which at least absorb large amounts of capital which might otherwise create a fresh demand for labor. By the erection of the bridge over the Frith of Forth, and of the Philadelphia City Hall, vast sums ranging from ten to fifteen millions of dollars in each case, have been withdrawn from the maintenance of labor. In the case of the Forth Bridge, it is thought that this capital is productively spent. I wish that as much could be said of the Philadelphia City Hall.

Where demand can be diverted from the purchase of labor, and can be directed to the employment of auxiliary capital in the production of the same commodities, the decision between using one or the other depends upon the cost of doing so, and upon that cost alone. Where however the decision depends upon the choice between different objects of unproductive expenditure, the relative demand for labor and for

the use of capital will not depend solely upon the existing rates of wages and of interest, but will depend in part also upon taste. To turn again to an example already given, the choice between employing a gardener and buying cotton or copper goods, depends in no small degree upon the price of each of these various things, but it also depends in great part upon the degree of appetite for each of them. But where the choice is between using capital and using labor in any one branch of manufacture, as, for instance, in the production of carpets or of nails, the decision between them will in any given state of the arts depend upon their relative hire, and upon that exclusively; for, as between two methods of obtaining the same result, cheapness must be the sole guide.

The conclusion is inevitable, that if labor is is dear, people will discard it to a greater or less extent. They will find new methods whereby the same results can be had by using more capital and less labor. They will also abandon the employment of unproductive labor, and the consumption of articles produced mainly by labor, and will consume instead a greater amount of the articles into whose production capital largely enters.

To every different imaginable price for labor there corresponds a different amount of effective demand. Every rise in the price of labor restricts its uses and curtails the demand; every fall in price creates new uses and increased demand. But either a rise or a fall sets influences at work which restrict its own extension.

Where then we may ask is the equililibrium of price to be found? Or at what price will the demand be just equal to the amount of the

existing supply? This, of course, can only be at such a price, that it is impossible for employers to get any advantage by substituting capital for labor, or labor for capital.

The relative advantages of labor and of capital vary so greatly in their different uses, that whatever may be their hire at any time, it will in most of their employments be impossible to substitute one for the other, unless a vast change should occur in the relative price of using them. In a considerable number of cases, however, their relative advantages are less great, and in some they are quite small. In such cases a moderate change in wages or interest will induce substitution of one for the other.

In yet other cases, these relative advantages of labor and capital disappear entirely. In them the amounts of labor and capital which will do the same work can be hired for the same price, and employers give no preference to one over the other, but use either indifferently. In these employments it may be said of labor as of capital also, that each is here at its final utility. For in every other use of labor its utility is greater as compared with that of auxiliary capital than what it is here, and the utility of capital is in all its other uses greater as compared with that of labor than what it is in this use.

Just as the final utility of any other commodity, the utility, that is, of the last portion used, fixes the prices of the whole supply of that commodity; so the relative final utilities of labor and of capital fix their relative prices; and the wages of labor and the interest on capital are the same in all their employments as they are here.

We may state this law of wages in the following terms: *The price of a given amount of labor is the same as the price paid for the use of such amount of capital as would replace that labor in those employments where labor and capital are interchangeable and where either can be used to equal advantage.*

It might seem that we had now reached the final solution of the wages question, and that in order to ascertain the price of labor, it would further be necessary only to observe where the interchange of labor and capital occurs. Since the hire of a day's labor is the same as the hire of such a quantity of capital as is there interchangeable with it; it would only be necessary when this amount of capital is ascertained, for us to compute how much the interest on it would be. Such a procedure would end the question very neatly; but, unfortunately, it assumes a knowledge of two things, both of which are really unknown. It assumes in the first place that we know what amount of labor and capital are actually interchangeable with each other; and it also assumes that the rate of interest can be ascertained independently of any knowledge of the rate of wages. A little consideration, however, of what has preceded will show that the rate of interest depends on the price of labor in exactly the same degree and manner that the price of labor depends on the rate of interest. Neither of the two can be ascertained independently of the other. The problem of wages and the problem of interest cannot be separated. The solution of each is involved in the solution of the other, and both will be simultaneously solved so soon as it is shown what are the amounts of labor

and of capital which are interchangeable. This question still remains for us to attempt.

What then is the value of our formula and to what use can it be put?

It is valuable because it disposes of certain erroneous assumptions, which play a part in some of the theories of wages. It shows, in the first place, that the amount of labor which people want to buy, and do buy, depends in part upon its price; and it disproves any theory inconsistent with this fact. It shows, in the second place, that the division of capital into an auxiliary fund and a remunerative fund does not take place independently of the price of labor; and that consequently any theory must be at fault which implies such an assumption. It shows, in the third place, that the problems of wages and of interest are one and the same, and that since it is not possible to ascertain the amount of either one of them apart from the amount of the other, so therefore neither of them can be properly treated as a mere residuum which is left after defraying the other out of the total product of industry. And although it may not itself acquaint us with the rate of wages, it is of the utmost use in pointing out the way in which we must search for that rate. It exhibits the instrumentality through which the price affects the demand, and by so doing it supplies the element which has hitherto been lacking to the theory of wages,—a knowledge, that is, of the conditions with which price must comply in order to make demand equal supply.

Where the supply of anything is a fixed amount, it has long been known that whenever the demand exceeds it, the high price ensuing causes such a

reaction, as again to reduce the demand to the limit of the existing supply. And it has been recognized that this is principally accomplished by the influence of price in inducing buyers to substitute some other object of desire or consumption for that which they had originally intended. Otherwise equilibrium in price, and equality of supply and demand, which is the condition of that equilibrium, could never be reached.

Until the present time, however, the possibility of finding a substitute for labor has not been recognized. Were no such substitute to be had, the law of supply and demand could not operate in its usual manner. The failure of economists to recognize the possibility of finding a substitute, must explain why they have sought outside of the equation of supply and demand for the principles which dictate the law of wages. It is to supply their omission that the preparation of this paper has been undertaken. But the principle of the interchangeability of labor and capital, which I have laid down, is not itself one of the causes of the demand for labor; it merely serves to strike the balance between the elements which constitute that demand. It is like the governor on an engine, which itself furnishes no power but which regulates the power supplied by other agencies.

We will now turn to a consideration of what those agencies are.

III.

Although the ultimate causes affecting wages were most of them long since observed, and although their nature has been the subject of prolonged dis-

cussion, economists, for want of a proper clue to the mechanism by which their operations are coördinated, have failed to settle any well established body of scientific truth, or even to come to any general agreement in their own teachings, concerning them.

They have not even made it clear whether wages and interest generally vary alike, rising and falling together, or whether such rise as may take place in the one is usually accompanied by a fall in the other. It was said by Mr. Ricardo that "nothing can affect profits but a rise in wages," and that "in proportion as wages rose, profits would fall." These sayings gained a widespread acceptance among the older economists. Business men and laborers on the other hand, in conducting their own affairs, have frequently assumed that wages and profits commonly rise and fall together. So firmly is this opinion held, that when contracts are made for labor covering considerable periods of time in advance, it is quite usual to stipulate a sliding scale whereby the wage rises or falls with the price of the finished product.

How are we to explain this difference of opinion between theorists and practical men? Is that which seems to be true in theory false in practice? Or is it not rather true, that of the causes which affect wages and interest (or profits, to use Ricardo's phraseology), some affect both in the same way, but others affect them in opposite ways? The latter answer is no doubt the true one. Some of the variations in wages and interest do happen concurrently in both, so that labor and capital gain or lose alike in their compensation. Other variations take place in opposite directions, so that whatever is gained by labor or by capital is only gained by one at the expense of the other.

The interchangeability of labor and capital affords a touchstone by which we can discriminate between the causes which act in these two different ways. Whatever affects wages or interest, and yet suffers the same amount of labor and of auxiliary capital as formerly to interchange at equal cost, must affect wages and interest alike. On the other hand whatever alters this rate of interchange affects wages and interest divergently.

The first class of causes may all be summed up in the productiveness of industry. At some one place, or one time, given amounts of labor and capital, obtain a far greater return than what they do at some other place, or other time. Every comparison which is made of the welfare and of the industrial condition of different countries and of different epochs is an illustration of this truth.

The differences in the productiveness of industry are due either to differences in the abundance with which nature spreads her bounties, or to differences in the effectiveness of the methods by which men turn these to account. But unless they are accompanied by differences in the relative efficiency of capital and labor as compared with each other, differences in the productiveness of industry afford no reason for any alteration in the rate of interchange of labor and capital. The same amounts of labor and of capital which were formerly compensated equally, still are so, and the product is distributed between labor and capital in the same proportions as before. To whatever extent interest rises or falls, wages rise or fall in the same degree.

I just said that variations in the productiveness of industry are due to variations in the abundance of

the resources of nature and of man's skill in utilizing those resources. Their overwhelming importance in determining the welfare of mankind is thoroughly established, and has been fully set forth in the writings of the President of this Association. For that reason and also because they figure less largely in the dispute between different classes of society, I shall not allow them to detain me longer here, but shall pass on to the enquiry into those influences which affect wages and interest in opposite ways.

If at one time or place, interest, or the hire of capital, is higher in proportion to wages, or the hire of labor, than it is at another time or place, this can only be because men are relatively more anxious to acquire the use of capital in the one case than in the other; and this greater anxiety is aroused either because capital is harder to get as compared with labor, or else because it is more useful. In the first case the change is due to a change in the relative supplies of capital and of labor; in the latter case it is due to a change in the conditions under which industry is prosecuted.

We will first consider the latter case, and here we may observe that the utility of labor or of capital is itself the resultant of two things. In order to be useful, labor and capital must be efficient in producing objects; but this is not enough, unless the objects produced are also the objects of human desire. Their relative utilities are in proportion to the sum of objects produced, and in proportion likewise to the power of those objects to satisfy the cravings of appetite. We lately saw that the degree of the general productive-

ness of industry is determined by the abundance of the resources which nature places at man's disposal, and by man's knowledge of the ways to utilize them. The relative efficiency of labor and capital is determined by the degree in which the natural resources and the state of the arts open avenues for the advantageous employment of one or the other.

In some cases nature favors the use of labor, and in others she favors the use of capital. The growth of flax and of hemp, and their preparation for the market, require a great deal of labor as compared with the capital employed. The growth of wool requires but little; so does the growth of oranges, or of olives. Most kinds of garden produce on the other hand more closely resemble flax in this respect; nevertheless asparagus rather resembles oranges and olives. Each country will devote itself to the growth of that crop for which it is best suited, and will supply its wants of other things by exchange. If the people of the country which grows oranges wish for flax, they will obtain it by giving oranges in exchange to the people of the flax-growing country. They will supply their wants of other commodities in the same way. Thus the needs of each country will be supplied in the cheapest manner. The demand for labor, however, will be far greater in the flax-growing country relatively to the demand for capital, and should the supplies of labor and of capital be the same in both countries, wages will be higher where flax is grown and interest where oranges are grown. Or to look at the same thing from another point of view, in order that wages and interest should be the same in both countries, it will be necessary that the relative supplies of labor and capital be different.

As she affords special facilities also for manufactures or for commerce, nature more greatly favors the employment of capital in some regions than in others. The witty Floretines taunted their Genoese rivals with their bare mountains and barren seas. A soil ill adapted to profitable cultivation, and a sea which refused its usual supply of food, left open to the Genoese one only avenue to wealth, namely commerce,—and into that they plunged so earnestly, that Genoa at the height of her glory was among all the cities of Europe probably second in wealth only to Venice. In no trade perhaps does nature require a greater amount of capital in proportion to labor than in navigation, the peculiar trade of the Genoese. Had Genoa possessed no greater proportion of capital to labor than was employed in the agricultural countries with which she traded, the demand for its use would have pushed interest to an excessively high point, while wages would have sunk very low and much labor would probably have failed to get employment. Yet, as a matter of fact, it is probable that laborers were well paid, and that wages were in Genoa as high or higher than elsewhere; for it often happens that the opportunity of using capital to advantage so stirs up the disposition to accumulate it, as to more than counterbalance any disadvantage under which labor might otherwise suffer. But for wages to be increased in this way it is necessary that capital should still more greatly increase.

The differences in the natural resources in different places are permanent; but they can only be practically effective in so far as their aptitudes are known to mankind, and as means are devised to utilize

them. The knowledge how to do this, and the degree of skill in applying that knowledge vary immensely at different times and places. The earliest marine architecture was unequal to the construction of any more important works than hide coracles and dug-out canoes. The labor of the first navigators was thus employed with an instrument of the cheapest kind, produced by a few days' toil. There has been no change in the facilities provided by nature, but the introduction of successive improvements has led to an ever increasing use of capital, until now an Atlantic liner navigated by three hundred men costs perhaps one million dollars, and represents for each man employed a capital of over three thousand dollars, or the equivalent of more than five years labor.

The development of knowledge and skill, or the course of improvements, is the most distinctive feature of industrial progress. It consists to a very great degree in the discovery and adoption of new ways of using capital, and it almost constantly increases the relative demand for capital at the expense of labor. Even such increase in the efficiency of labor as does occur, consists mostly in the acquisition by the laborers of aptitudes for manipulating larger amounts of fixed capital ; it does not often aid labor to supplant capital.

Nature and art indicate what industries are possible, and by what means they may be conducted, but they do not decide which industry or which methods shall prevail. I know of regions which have a marvelous facility for producing Canada thistles, but I have yet to hear of a single farmer who has regu-

larly adopted this branch of agriculture. In utter disregard of the rights of private property, the State of Pennsylvania has even made it a misdemeanor, to have a single specimen of this enterprising vegetable found growing upon one's own estate. The reason is plain. Nobody wants thistles. They minister to no appetites, unless to those of donkeys and goats, animals not highly prized in Pennsylvania. The State of Florida is well adapted to the growth of oranges, and, oranges being a fruit of ready sale, their growth has extended widely. By exchanging oranges for such products of other regions as they desire, the people of Florida satisfy their wants by means of a business which employs large amounts of capital and comparatively small amounts of labor. But if nobody cared to buy their oranges, the people of Florida could not do this. If, for instance, they wished flax, they would in that case have to produce it themselves. Not only would they obtain less flax than they now do, but they would also, and this is the point which interests us here, obtain it only by employing proportionately more labor and less capital than they now employ to obtain the same result. In this way they would enhance the rate of wages at the expense of interest.

The direction of industry will always in the last resort be dictated by human appetites or desires. For it is only in order to gratify them, that industry exists at all, and in obeying their behests it merely fulfils the purpose of its being. The natural resources and the state of the arts only influence the demand for labor, because they define the possible industrial operations from among which desire may select those which are capable of yielding to

it the most congenial and amplest gratifications. Desire siezes upon one or another of these opportunities according to the promptings of inner impulses. These impulses or appetites are a part of the constitution of the human mind and body, and they display the most varied preferences between different objects. If, from among the industrial operations made possible by nature and art, desire chooses those in which labor preponderates, it determines a large demand toward labor and creates a high rate of wages; if it chooses those in which capital is the predominant element, it stimulates the use of capital and enhances the rate of interest.

We now turn to those influences which, while they affect wages and interest in opposite ways, arise, not from differences in the relative utility of labor and capital, but from differences in their relative abundance or scarcity. It would, however, be certainly worse than useless for me to detain you here, in order to demonstrate for the thousandth time, that abundance of capital is conducive to a high rate of wages, and that scarcity of capital permits only of a low rate. This we may take for granted. My business is rather to show in what manner the supply of capital exerts its influence and under what limitations it acts.

The old doctrine of the wages fund is familiar to all. That doctrine in its original and simplest form ignores all influences affecting the rate of wages, except such as arise from the relative amounts of population and of capital. It assumes either that the whole amount of capital, or that some given proportion of it, is divided periodically among the laborers as wages, and that consequently every

change in the relative amounts of capital and of population is followed by an exactly proportionate change in the rate of wages. I do not propose to enter upon a detailed analysis or criticism of this theory. When, however, we consider that every change in the rate of wages produces changes in the demand for labor, and consequent changes in the division of capital between its auxiliary and remunerative uses; and when we observe the manner in which nature, and art, and human desire, variously influence the relative utility of labor and of auxiliary capital, and the demand for their use; and, when we contemplate the varying proportions of labor and capital employed in different occupations, and in different countries, and in different epochs; it becomes obvious that the early form of this theory requires serious modifications, in order to make it tenable at all.

But I shall not detain you in order to ask whether it is possible to restate the wages fund theory in such way as to recognize and account for these facts, and to form a correct explanation of the phenomena of wages; nor shall I enquire whether, if successful, the result would be worth the effort. My purpose is not critical but constructive, and my endeavor is rather to show how the influences arising from the relative supplies of labor and of capital are coördinated with other influences; and to prove, that, assuming perfect competition and perfect mobility of capital and labor to prevail, these various influences join in a tendency, the law of whose action is as certain as any law in Political Economy, however intricate and difficult it may be to follow all the ratifications and subtle workings of its influence.

The supplies of labor and of capital which exist at any time constitute the means whereby wealth is created out of the materials supplied by nature.

The resources which nature affords, in that degree in which their possibilities are known and made available by the state of the productive arts, determine what things can be done, and what are the relative proportions of labor and capital which are needed to do them.

Within the limits of the opportunities which nature and art thus offer, the character of human desires determines which things shall be actually accomplished. Upon their decision depends the relative demand for the use of labor and of capital. The order of their precedency depends upon the relative utility and also upon the relative costs of their objects. In so far as they are guided by appetite only, they stimulate the demand for labor or the demand for capital, according as their objects require more of one or of the other to produce them. In so far, however, as desire gives way to cheapness, and as the choice of its objects is modified by the consideration of their relative costs, it opens the avenue by which the price influences the demand. The reason why desire allows itself to be guided by cheapness is that the power to supply its wants is limited, and that, by considering the relative cheapness of different objects, it can make its selection from among them in such a way as to multiply the gratifications which it obtains.

Into the field of industry designated by nature, and art, and desire; labor and capital, rival applicants for employment, push their way. The infinite variety and number of different operations which fill this

field, range themselves so, that in one end of the field stand those which capital alone can perform, or in which its superiority over labor is uncontested. Upon these capital seizes at once. Labor in the same manner seizes upon those for which its aptitudes are the greatest. These stand in the other end of the field. In an intermediate position stand others for whose pursuit it is less easy to fortell whether labor or capital is best fitted. These must be distributed between labor and capital in such a way that the whole amounts of labor and of capital shall be employed, for otherwise price could not be in equilibrium. They must also be distributed in such manner that labor and capital is each employed where it is most effective.

Somewhere there must be a line, of which it can be predicted, that on one side capital alone will be used, and labor on the other side. Here and here alone their relative advantages are equal; here it may be said that neither possesses any superiority over the other; here either may be employed.

Where this line shall be, and how the division of the field shall take place, depends, in the first place, upon the character of the operations, which under the dictation of nature, of art, and of desire, constitute the field of industry. The character of the field being thus determined, the question as to how much of it shall be held by capital, and how much shall be held by labor, depends upon the relative amounts of labor and of capital. The line of demarcation between them must be so located that it is impossible to substitute labor or capital one for the other in the production of any commodity, in such manner as to lessen its cost. And those

employments in which interchange occurs at equal costs, determine the relative hire of labor and of capital, and determine also the rate at which labor and capital interchange with each other.

In an earlier part of this paper I stated the law of wages as follows :—

The price of a given amount of labor is the same as the price paid for the use of such amount of capital as would replace that labor in those employments where labor and capital are interchangeable, and where either can be used to equal advantage.

I also called attention to the inadequacy of this statement, arising from its failure to indicate what determines the amounts of labor and capital which shall be interchangeable. We are now in a position to remedy this defect, and to do so we may lay down this additional law :—

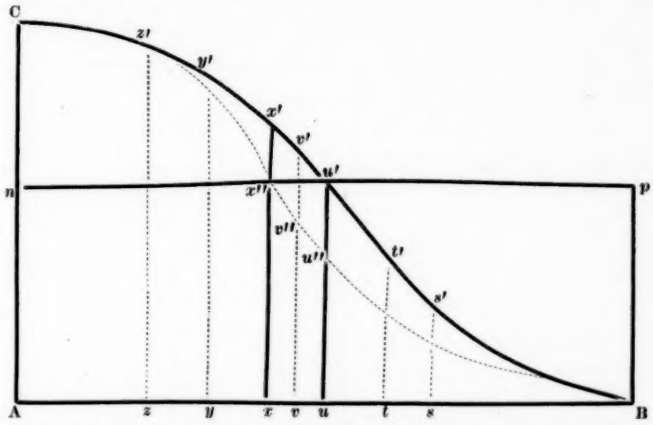
Labor and capital are interchangeable and are used indifferently where their relative utilities merge, or where each may be said to be at its final relative utility. The decision as to the point where this shall occur is due, in the first place, to the relative demand for their use arising from the combined action of nature, art, and desire; and, in the second place, to the relative abundance of their supplies, which distribute themselves over the demand in such way that each is employed in those occupations for which it is best fitted.

The same prices, which are paid for such amounts of labor and capital as are interchangeable in those occupations where they are indifferently employed, are also paid for equal amounts of labor and capital in whatever other employment they may be engaged in.

The amounts of labor and of capital, which are interchangeable at the margin where they are indifferently used form what we may call units of interchange. And if we wish to know how the entire product of industry is divided between labor and capital, we need, when the rate of interchange is ascertained, only to enquire what is the total amount of capital and the total number of laborers. If the labor of one man of a given standard of efficiency is paid as much in wages as $10,000 of capital is paid in interest, then one man and $10,000 will be the units of interchange for labor and capital respectively. And if there are 1,000,000 laborers of the standard degree of efficiency, making due allowance for the fact that some exceed it and that some fall short of it, and if there is a capital of $4,000,000,000, there will then be 400,000 units of interchange of capital as against 1,000,000 units of labor. The proportion of the product which capital receives will then bear to that portion which labor receives the ratio of four to ten or two sevenths.

I will further illustrate by the accompanying diagram the propositions which I have laid down. Let the line AB be made up of the series of the possible operations of industry arranged in the order of the relative amounts of labor and of capital needed in each to accomplish the same result; and let ss', tt', uu', vv', xx', yy', and zz' represent the amount of capital, which will in the case of the operations s, t, u, v, x, y, and z do as much work as one man. The nearer we approach to B the greater will be the advantage of using capital, while as we

recede from B the advantage of using labor will grow at each step. At every imaginable price there must be some point where the advantages of using capital, and those of using labor, are equally balanced, and where either will be indifferently employed. We will suppose *u* to be the point at which the balance of advantage will ultimately settle. The line *uu'* will then represent the unit of interchange of capital,



being the amount of capital which can be interchanged with the labor of one man, and will do the same work and receive the same compensation. The same line *uu'* may also be taken to represent the labor of one man. The space enclosed between the line B*u*, the line B*u'*, and the line *uu'* will represent the total amount of auxiliary capital existing, for it is all employed in the operations between B and *u*. The amount of labor which would be needed to do the same work would be represented by the parallelogram B*uu'p*. As on this side of *uu'* all work is done by auxiliary capital,

so on the other side of uu' all work is done by labor, and the amount of labor needed will be represented by the parallelogram $Auu'n$, whereas to accomplish the same work by capital would require an amount represented by $Auu'C$. I may add, that while the figure pretty well represents the relative advantages of labor and capital in the middle part of the curve, it perhaps fails to show how greatly divergent they are at the extremes; for at the extremes the degree of their disparity is well nigh if not quite infinite, a relation which cannot be portrayed in this figure.

Now let me call attention to the manner in which the action of the various factors which I have mentioned as going to make up the rate of wages may be separately illustrated by this diagram. In the first place the location of the line BC is decided by nature, art, and desire, which things determine both what operations shall be prosecuted, and what the means are by which they may be prosecuted. If nature, art, and desire, instead of causing the line BC to pass through u' and x', should cause it to pass through u'' and x'' in such manner that the figure Bxx'' would be is equal to Buu', the point x and line xx'' would become the place of interchange instead of u and uu'. If, as represented in the diagram, xx'' should equal uu', wages will be unchanged, otherwise they will be raised or depressed, as xx'' happens to exceed or to fall short of uu'. Since, however, labor would be thrown out of employment in the occupations between u and x, a reaction would follow so that the line of interchange would be forced in some degree back toward B, perhaps to vv'', and there would be a corresponding fall in wages and in

the amount of the capital which would now be equivalent to one day's labor.

The location of the line BC, and the character of industry, being once fixed, the division between labor and capital of the different employments repesented by the line AB is determined by their relative amounts. We have supposed uu' to be the line of interchange. This requires that Buu' represent the total existing auxiliary capital and $Anu'u$ the total supply of labor. Were capital however to increase in proportion to labor, so as to be represented no longer by Buu', but by Bxx', then xx' would become the line of interchange, and wages would rise by the difference between uu' and xx', except in so far as the throwing out of employment of the amount of labor represented by $uxx'u'$ would cause a certain degree of reaction, so that a final settlement of equilibrium would occur at v' perhaps.

In describing the effects upon wages of nature, of art, of desire, and of the supply of capital and labor I have enumerated all the element of the wages question. I have attempted also to show how their influences harmonize in the law of wages. So long as their action is uniform equilibrium prevails, and the rate of wages remains unchanged at such a point as, under the existing circumstances, will satisfy that law. Let any one of these circumstances however change, and at once the equilibrium of price, and of supply and demand, will be destroyed, and a train of secondary changes and influences will be induced. Equilibrium can only be restored when after wavering back and forth in sympathy with all these ifluences, the

line of demarcation between the employments of capital and those of labor comes to rest finally in a new location.

This final resting place must always be such, that it is impossible to substitute labor or capital for each other in the production of any commodity so as to lessen its cost. And the character of those employments in which interchange does occur at equal costs, determines the relative hire of labor and capital, and determines also the rate in which labor and capital interchange with each other.

IV.

In this paper I have assumed a state of perfect competition, and absolute mobility of labor and capital; I have neglected the influence of rent, and have disregarded the coëxistence of different qualities of labor, and have overlooked the important function of the undertaker or *entrepreneur* If, by selecting for discussion a single problem, I have attempted to eliminate all disturbing causes, it is not, that I suppose that such disturbing causes are ever absent in real life, or that economic causes ever act *in vacuo*. I do, however, believe that there is an advantage in tracing separately the effects of different causes, and of distinguishing in thought, at least, those tendencies which in life are inextricably mingled. It is with this qualification that I ask your verdict on my work.

Again, if I have spoken of the rate of wages or price of labor as being the compensation of labor measured in the standard of money or of general

value, and not as measured in the food and clothing and other satisfactions which are the true recompense of the laborer's toil, this is not because I fail to recognize that the problem of the laborer's welfare is beyond all comparison the most interesting feature of the wages question; it is because, to arrive at any correct inference, we must travel by the road of causation over whatever paths it may lead. To refuse to do so in the case of wages and labor would only be a spurious philanthropy.

But time warns me to encroach no further on your patience; and easily as the laws of the real remuneration of labor may be deduced from those laws of its price which I have endeavored to expound, I will not prolong this discussion, but will close it now with my thanks for your indulgent attention.

POSSIBILITY OF A SCIENTIFIC LAW OF WAGES.

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The Possibility of a Scientific Law of Wages.[1]

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To a majority of men there is only one economic law that appears to have much direct importance. To these men the resultant of all the industrial forces takes the practical shape of wage payments. On the amount of these payments depend personal results in being and development that extend into intellectual and moral spheres. The formula that permanently expresses the rate of wages indicates the average level of human life.

Of the Wage Fund doctrine there survives nothing but the general truth that an enlargement of social capital tends to cause an increase in the rate of payment for labor. For its survival in popular belief this truth is in no way indebted to the Wage Fund theory; it was never the reasonings of the theory that caused men to accept it. On the contrary it was the antecedent belief in this truth itself that led men to accept with very little analysis the doctrine that harmonized with it.

Can there be a wholly different law that will account for this and for other facts concerning labor and its earnings? What requirements must a theory fulfill if it would do this scientifically?

It must, first, be a natural law. It must be based

[1] Paper read at Third Annual Meeting of the American Economic Association, in Philadelphia, December 27, 1888.

on native impulses in men and in society. But the self-seeking impulse, under modern conditions, leads men to mass their forces in great combinations, and of these any economic law must take account. It must reduce to a scientific system the action of pools, trusts and labor unions.

A wage theory must, secondly, be universal in its application. It must be based, not on forces that operate within national boundaries, but on those that reach all localities and continue through all normal conditions. A theory that should be true only in America, and only during the era in which the inhabitants of this country are engaged in a process of land spoliation, would not fulfil the requirements of a general economic law. Such a law must explain facts that appear where cropping soils, leveling forests and emptying ducts of natural gas and oil are not the means resorted to to gain wealth. It must interpret the phenomena of a normal and permanent production.

When, moreover, the deeper laws of society are understood it appears that the great organism is much like an individual man. Its actions are essentially simple, and laws that truthfully account for them are found to have a corresponding simplicity.

In the search for such a law our hope of success lies in making, at the outset, a study that is remorselessly theoretical. There is a time for the consideration of those "practical facts" that vitiate at a thousand points the operation of pure principles; but that time is not when the object of the quest is a fundamental law itself. There is no probability that disturbing influences will be forgotten. The actual

danger lies in the direction of a temporary forgetfulness of law. That which in social industry is general and permanent is in some danger of being buried from sight by that which is local and transient. The grasp of permanent tendencies may be weakened by too high a mental valuation of counter forces. In the search for a law that is not yet known, the counter-influences must be disregarded. When the law has been discovered these influences need to be considered and measured. A study that begins with the assumption of a theoretically perfect competition, and of an absolute mobility of labor and capital, may well end with a study of every obstacle that these movements encounter. A wage law such as we are seeking will not be abrogated by the local hindrances that it meets. We may find that it works with particular force amid the greatest of them.

A theory of distribution may have a certain completeness without directly accounting for all the shares into which the social income is divided. If there were four partners in a business firm the portion of income falling to either might be ascertained if the earnings of the entire business were known, and if the shares of the three other partners were determined. It would afford a certain mental satisfaction to ascertain each amount directly; and this method, if it were practicable, would lessen the probability of error and controversy. The preference in favor of this method would be decisive if, in actual fact, each separate share were directly determined by some distinguishable force. Our present inquiry, then, takes this form: *Is the reward of labor, in the industry of the world, directly controlled by a permanent and distinguishable force?*

Where a man works without capital and without a master his wages are determined by a physical law; they are what he is able to produce.[1] There are points in the industrial system where men appear to work in this way, and at these points the physical law asserts itself; what they create they get. A settler tilling no-rent land with a hoe and a spade would seem to illustrate the process. He has not capital enough to complicate the problem; and he must not, by the terms of the problem, be allowed to own the land. If he is the owner of his farm, like a homestead settler in the United States, a complication arises which entirely vitiates the law. His reward is not, then, merely what he can create by cultivating the soil, but is largely what he can gain by owning it. The greater part of his income consists in the so-called unearned increment of land value. It may be also noted that, in conditions in which the gains of homestead settlers set the general standard of wages, that standard is fixed at a point far above the figure that expresses the returns from actual tillage. Near the frontier of settlement an employer of mechanical labor must pay enough to induce his men to forego, not merely what they could get from the soil with spade and hoe, but what they could make by occupying farms that must rise in value on their hands. Every man here who works, whether on the farm or away from it, gets the benefit of this rise. The increments of land value diffuse themselves everywhere. To the right

[1] We here assume that a system of exchanges exists, and that the articles produced by the independent worker have certain values. What he will then get, as the reward of his own labor, depends on the quantity of those articles that he can create.

and to the left, through all trades and callings, they find their way. For a hundred years American wages as a whole have been raised by this influence. They have been made to conform, nearly or more remotely in different cases, to a standard fixed, not by the returns realized from the working of free farms, but by the total gains derived from the working and owning of them.

Remove the larger of these sources of income, and you reduce the gains of empty handed labor to a natural level. Make the settler an occupier and not an owner of land, and he will get only what he can make it yield by tillage. If his returns gauge those of workmen generally the earnings of all will be thus reduced. Nationalize land and demand rent for it, and you instantly abandon the special and high standard to which American wages have thus far tended to conform.

The theory that the general reward of labor is fixed by the gains that men can realize by tilling no-rent land, if this theory has any accurate meaning, must claim that when land is not to be had in fee simple for the asking, but when valueless land may be occupied rent free, the gains realized by workmen in all departments are gauged by the product realized on such land by actual hand tillage. It means that the workers in Belgian mills must take, with allowance for minor variations, what Belgian peasants get by cultivating the sandy wastes that border the sea. It means that the watch-makers of Switzerland must accept pay that, with similar allowance, tends to conform to the amount that their peasant countrymen can extort from patches of green among the crags. It means that, when the free

lands of America shall all have been allotted to owners, wage-earners will generally get what any one of them might produce, if he chose to build a shanty, and by the sufferance of a proprietor, till a piece of poor and untenanted ground. This would be a peculiar kind of "squatter sovereignty,"—the man in the shanty, dominating labor, extending his power over workmen of every class and fixing the amount of their wages and the consequent level of their lives.

Yet there may be a no-rent territory where it is not absurd to look for the forces that regulate general wages. There may be a part of the industrial field where men work virtually empty-handed. They may enter this region without capital and get what they produce. What they thus get others may have to accept.

It is a familiar commercial principle that the price of the last increment of the supply of any commodity fixes the general price of that article. English quotations gauge the price of American wheat. The farmers of the North-west must take for their entire supply of this grain what the final portion of it brings when sent to Liverpool. This, however, is because England represents the general European market, in which the entire surplus product must be sold. It is a receiving ground of indefinite capacity. Add fifty million bushels to the exportable crop; Europe will receive it, at a somewhat reduced price; and the English quotations will indicate the amount of the reduction. A small market would have no such power. Iceland or Labrador may import American wheat; but quotations from there have no commercial significance.

Now the popular mind has not failed to see that, as an outlet for surplus labor, land at the actual margin of cultivation is more like Iceland than like Liverpool. It wholly lacks the capacity to receive the possible overflow of the supply. In comparison with the demands that might easily be made on it the extent of such a market is microscopic. Turn the whole overflow of the Belgian population upon the sands for a living, and calculate, if possible, how far below the starvation limit their earnings must, by a mathematical necessity, fall. Is there, then, anywhere a market that is to labor what the European market is to wheat? Is there a place where surplus labor may always betake itself, and, at some living rate, effect a disposal of the whole supply? If so, there is a point where general wages are adjusted, and there are distinguishable forces that make the adjustment; our problem is solved. Let us make the attempt to find such a market.

Men virtually labor empty-handed and get all that they create elsewhere than on lands at the agricultural margin. The true margin of cultivation,—more accurately that of utilization,—is not wholly nor chiefly an agricultural thing. It extends throughout the industrial system. There are other productive instruments than land that yield no rent to their owners, and may be had for the use of laborers for the asking. The workmen themselves may not, indeed, be able to borrow them; but the interest of the men termed entrepreneurs ensures that they will be borrowed and put into service whenever wages, including pay for superintendence and for other labor, may thereby be secured. There is a margin of utilization in cotton-spinning, in iron-smelting, in

shopkeeping. If we are seeking for places in which men work under no burden of interest or rent we shall find them in plenty without resorting to waste lands.

There are mills and furnaces so badly located that their proprietors get nothing from them; yet they run, if superintendents can there earn their salaries and manual workers their ordinary wages. There are machines that have outlived their usefulness to their owners, and that still do their work, and give their entire product to the men who operate them. There are railroads and steamship lines that earn operating expenses only. There are stocks of merchandise so poor that it barely pays salesmen to handle them. Everywhere, in indefinite variety and extent, are no-rent instruments; and if labor uses them it gets the entire product of the operation. Let the general rate of wages rise, and many of them will be thrown out of use; let the rate fall, and the utilizing of them will be resumed. Let a race migration depopulate one land, and over-crowd another; in the former country the no-rent instruments of every sort will be abandoned, while in the latter such as are idle will be put into active use.

The entire product gained by the utilization of the poorest instruments that are brought into productive action goes to the men who work with them; and the amount of this product corresponds with and expresses the rate of general wages. Does it regulate that rate? Is there any force compelling workers everywhere to accept what the men with the poorest productive machinery are able to produce? Not unless the overflow market for general labor is here. Not unless the field afforded by the

use of the valueless agents is the one to which idle men regularly resort for work. If this field is the commercial outlet for surplus labor, if it is an adequate receiving ground for all workers not elsewhere provided for, then the gains there realized set a general market standard of wages, and all workers are compelled to accept it. This field is not such a receiving ground. It is larger than the marginal territory of mere agriculture; but it is not adequate to provide for the possible overflow of a laboring population. Our problem is not yet solved. We must consult facts and see where men may and do resort when out of employment.

Reverting to agriculture we find an intensive as well as an extensive marginal field. For one man who finds work by pushing the boundary of the tilled area into no-rent territory, there are many who find it by a harder tillage of rent paying lands. Whenever one waste farm is brought into use new men are employed on many good ones. The point at which it ceases to be profitable to add to the amount of labor spent on good land may be termed the intensive margin of cultivation. Ten men reap an old time harvest, and two more glean after them; the gleaners are, perhaps, on the intensive margin of cultivation. The product of their labor yields wages and nothing more.

This marginal line also may be traced throughout the industrial system. A hundred men may sail a steamship, or operate a mill or a shop. Five more will insure that it be better done; they will create an additional product that will barely pay their wages. The hundred men are within the rent paying area, while the five are on the intensive margin.

From the employer's point of view the area within which the five additional men find employment constitutes what we may call the zone of indifference, the territory within which it is of no importance to the employer whether the work be done or not. A small influence will determine whether or not he will hire the men. From the workman's point of view this is evident. I am a clerk out of employment; will you take me into your shop? Yes, if I can produce for you a tithe more than you will pay me in wages; no, if I produce a tithe less. You may or you may not take me if I can add to your previous product exactly what I am to get as a wage. My labor will then lie within the zone of economic indifference, and humanity or other motives will determine your action. I am in your employment; will you turn me off? Probably not till the product that my labor adds to the other earnings of the shop falls short of my actual wage

Within the total marginal field, as we have surveyed it, there may clearly be found employment for an indefinite number of men. While there may be shops so situated that not another laborer can be added to the present complement without appreciable loss, there are many more in which the amount of labor may be somewhat increased or somewhat decreased without materially affecting the employer's gains. In this intensive zone of indifference, supplemented as it is by the corresponding extensive one—the region of no-rent land and other instruments—surplus labor regularly seeks and finds its market. Where no inducement is otherwise offered to employers to take new workmen into their establishments, it is possible to create one by

lowering the wages asked. This, under free competition, is the normal policy of surplus labor; and we shall see how naturally, through this policy, the market for labor is made to widen. It receives all that comes to it. In this elastic market therefore, according to commercial law, the wages of all labor should be fixed. If commercial principles operate here all men must accept what the last men get who enter the market. These men are on the marginal territory, extensive or intensive; and they get what they produce. Sound reasoning would seem to give us at once this formula: *General wages tend to equal the actual product created by the last labor that is added to the social working force.* The men that run no-rent machinery, or extort the last increment of product from better machinery, or effect any of the final gleanings of the manufacturing field create a certain amount of wealth. They get the whole of it, and set the standard of pay for all the men in the mills.

In order that we may fully test this principle we must give to one more economic notion a general application, instead of one that is merely agricultural. The so-called law of Diminishing Returns has been applied to land under tillage. It has been said that labor applied to the soil becomes less and less productive as the amount of it expended on a given area is increased. With certain needed qualifications this statement is true; and yet if a limitless amount of capital be available with which to improve the land, the law as commonly stated does not hold true. If for every additional man that you employ in tilling a farm you spend ten corresponding units of capital in improving it, the farm labor itself

rapidly becomes, in an economic sense, more productive. This is, moreover, true whether the new capital invested in the land be the result of artificially changing the quality of it, as by draining, irrigating or otherwise, or whether it results from the mere fact of social growth. If population becomes dense, the land, even without artificial improvement, becomes a better and better instrument of production. Even though it acquires no new fertility, it comes to represent a larger and larger amount of wealth creating power.[1] If the economic quality of land thus improves rapidly, and if the amount of labor spent on each acre increases more slowly, then the gains from each day's labor expended tend to increase. That the law of diminishing returns of agriculture should hold literally true, it is necessary that the quality of the land, as an economic instrument, should remain the same.

A popular and thoroughly sound use of the term capital makes it to mean a fund of value invested in productive instruments of any and every sort. The man who invests a part of his fortune in land for any productive purpose has not diminished his capital by the means. Value invested in land figures on business inventories as capital, and for many scientific purposes it needs to do the same. We may, of course, employ this nomenclature, if we guard against confusion by our preliminary definitions. Capital, in the abstract sense of the term, is,

[1] If land rapidly *loses* fertility, as is the case with virgin soil that is subjected to cropping, it may then become a worse and worse economic instrument, in spite of the increasing density of population. In our argument we have assumed as constant the merely agricultural richness of the soil.

for our present purposes, value invested in productive instruments, whether land or otherwise. In this sense, land absorbs capital by the mere growth of society. It becomes more and more efficient as a wealth creator, and a greater and greater market price attaches to it.

Disregarding the special values that attach to lands that become available as building sites, etc., we may say that when, by means of general social growth, capital vests itself in the soil in a ratio that exceeds the rate of increase of the labor used in cultivating it, then the tillage of it is, if other factors remain unchanged, subject to a law, not of diminishing, but of increasing returns. When the farm is worth five thousand dollars there are, let us say, two men at work on it, on an average, through the season. If, now, when it becomes worth ten thousand dollars there are only three men there at work, it is certain that each of them creates a larger product by the application of his labor to the land than did the former two. The law of diminishing returns must take account of capital in more ways than even careful writers have recognized.

Stated in a form that is true and universal the law is this : *An increasing amount of labor applied to a fixed amount of pure capital yields a smaller and smaller rate of return.* Let there be ten thousand dollars' worth of productive instruments, and ten men to use them. Let each man be supposed to create, by the operation, a product worth three dollars a day. Raise, now, the number of workmen to twenty and let the capital remain the same, and each man will create less than before. A day's pro-

duct will be 3–x dollars. Each successive unit of labor employed in connection with a fixed amount of pure capital produces less than any of its predecessors.

Let the general social capital be a fixed fund, and let population continue to grow, and the last comers in the ranks of labor will find that their productive capacity is less than that of any who came before them. If these latest comers will accept what they produce, they can find employment. In this way the market is indefinitely elastic.

It remains to be seen whether this outlet for labor is in reality subjected to any demands that strain its capacity. If capital were to remain stationary in amount, and if the whole natural increase of labor were to pour into and beyond the marginal territory, the product created by the last comers would soon become less than a starvation amount; and if commercial principles were still to operate, all labor would quickly find itself on very short rations. But capital increases as well as labor. If the two increase in exact proportion to the amount of each that is now in existence, it is clear that the natural result is a symmetrical enlargement of existing industries. Farms, mills, shops, etc., add to their working forces, capital and labor *pro rata*, and the terms of distribution remain unchanged.

If labor were to increase more rapidly than capital a portion of the new labor would be provided for by the symmetrical enlargement of industries, while the remainder would constitute a surplus, and seek an outlet elsewhere. This portion would press upon the margin of its field and force it into unproductive regions. It would work with poorer instruments than

were formerly in use, and would make less remunerative uses of the better instruments. The final product of labor would become smaller and the general standard of its pay lower.[1]

If capital were to increase faster than labor, what would happen? This supposition corresponds to the general fact; there is continually appearing in the market of the world a surplus of capital to be disposed of. A part of the new capital balances the whole of the new labor, and the remainder looks elsewhere for a market. The earnings of capital are subject to identically the same law as those of labor; they are fixed by the product of the last increment that is brought into the field It is, moreover, subject to the same law of diminishing returns of which we have spoken. Let the labor supply remain fixed, and let capital increase, and each increment of the latter, as it enters the productive field, finds that it can create less than any of its predecessors. The general law of diminishing returns is two sided.

[1]What we have termed the margin of utilization, has thus far been defined with reference, not to pure capital, but to the concrete instruments in which pure capital embodies itself. The boundary line locates itself where there begins either the use of no-rent instruments, or no-rent uses of other instruments. A great number of the best industrial appliances are subjected to no-rent uses, since they are made to do, in addition to the work that yields a return to their owners, a supplementary work that yields wages only. It is possible to draw identically the same line with reference to pure capital; it then locates itself where workers cease to make demands on the funds of social capital; they work without calling more of it into requisition than was in use before. Those, for example, who use no-rent machines aid their labor by something in which no pure capital is embodied. Aside from what such a machine might bring as old material, it is worth nothing to its owner; and he can only get that residual value out of it by destroying it as a machine. It certainly embodies no active capital, and the man who begins

The direction of its operation is reversible. It applies to whichever of the two agents of production exceeds the other in the rate of its quantitative increase. Whenever there is a surplus of either agent, labor or capital, whenever there is a quantity of either not provided for in the existing adjustment of industry, that surplus is capable of creating less wealth per active unit than is the antecedent supply of the same agent. This self reversing force controls the general division of the social income.

Let us briefly trace the operation of this law in practice. It is capital that is in fact now subject to it. Between 1870 and 1880, the population of the civilized world increased, but its productive wealth increased more. An overplus of capital offered itself

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to utilize it makes no new demand on the social fund of productive wealth. Again, the workmen who resort to no-rent uses of good machines make thereby no drafts on the social productive fund. They take the machines at times and in ways in which they would otherwise be idle.

In both cases the men are virtually empty-handed laborers. In neither case do they literally work without appliances to aid them; and this fact has a bearing on the equities of distribution. The exact mode in which, in different cases, men use productive appliances without drawing on the fund of pure capital is an interesting subject of study. In few cases are they added to the working force under conditions that give precedence to the other workmen in the use of machinery. An employer would not often put a mechanic into his shop with the understanding that he should never have a bench or a lathe except when no other workman chanced to want it. He would place all workmen, old and new, on an equality; and if the appliances for work were inadequate, the inconvenience resulting from the fact would be distributed. The essential fact is, that under the circumstances, the last workmen employed make no new demands on capital. In effect it is, in this respect, as though these particular men were confined to the use of appliances that no one else wanted at all, or to the use of better appliances at times when no one else wanted them.

from time to time, to the directors of industry. Could they afford to hire it? Yes, wherever the product that it was capable of adding to the antecedent output of their mills, railroads, ships, mines, farms, etc., equalled or exceeded the interest that they were expected to pay for it. Through the general range of the field, the surplus of capital, could not and did not create such a product, and could not be hired at prevailing rates. It must abate its claims or be idle; and it chose the former alternative. It demanded, as interest, only what it could create, and thus set the standard of hire for all loan capital at a lower rate than had prevailed. Such, in our era, is the necessity under which capital permanently works. Increasing as it does, it must push outward the margin of its field, build railroads and canals, mills and warehouses, that tend to yield in each case, less than antecedent improvements of their several kinds. Each diminution of the final product reacts on interest throughout the field.

As an aid in determining whether a scientific law of wages is possible, we have now before us, not, as yet, such a law in its completeness, but the principle on which it may be based. What is necessary in order that we may complete the outline of the law itself? We have set for ourselves the problem of determining how an increase of capital affects the rate of wages; and it is now clear, from the law of diminishing returns, as just stated, that it must raise them. A fixed supply of labor and an increasing supply of pure capital, affect the rate of wages in the same manner, as a fixed supply of capital and a diminishing supply of labor. Leave the social fund of productive wealth undisturbed, and withdraw

laborers from the field, and it is clear that you reverse the action of the law of diminishing returns, as it applies to labor; the final increment of it creates a larger product than before, and the general rate of its pay is raised accordingly. An increase of the fund of capital while the labor supply is fixed, has of course, the same effect.

It is, however, desirable to have before us in a concrete way this action of the productive agents. Let us say that, in enlarging pure capital, we multiply productive instruments. We build new machines, mills, ships, railroads, drains, irrigating canals, etc. These, however perfect they may be in their mechanical working, render a smaller return to their owners, in proportion to their cost, than did antecedent instruments of their several kinds. The general rate of interest falls; and an effect of the fall is to make room for more labor in connection with all instruments of the better grade. Workmen abandon the poorest appliances in use and the least remunerative uses of better appliances. Instruments and uses of instruments by one degree higher in the scale now become the poorest within the industrial field, and give their entire products to the workmen. There has occurred, in short, a relocating of the no-rent line. Labor has been drawn from what was the periphery of its field into more central areas. The product of the final increment is now larger than before, and general wages are raised to the level of this new standard.[1]

[1]In this connection there will occur to the reader forms of investment of capital that enjoy the benefits of monopoly. These cases present no real difficulty, but need to be fully considered in a complete presentation of the law here outlined. It may now suffice to

There are in the problem quantitative elements that need to be considered. We should ascertain, if possible, how great an increase of social capital is necessary in order to produce a given rise in wages. In this study we should apply a principle presented, with admirable clearness, by Mr. Stuart Wood, in a recent issue of the *Quarterly Journal of Economics*, and presented also, in greater completeness, in a paper read before the recent meeting of the American Economic Association. As capital outgrows labor in quantity it not only pushes outward the independent margin of its own field, but encroaches, at certain points, on the territory of labor itself. This fact diminishes the rapidity with which increasing capital tends to raise the rate of wages.

With the margin of the labor field receding instead of advancing, we must regard as the final increment of labor the one that has lately abandoned its field for a richer one. The men who set the standard of wages are in the rear rank, not in the front. They have, as we have said, discontinued the use of the productive instruments that recently figured as the poorest in the field, because others by one grade better may now be had rent free.[1] They have abandoned the least fruitful uses of good in-

say that a monopoly increases the amount of pure capital represented by a particular productive instrument. A public franchise puts pure capital into the plant of a street railroad, as social growth imparts it to land. Cost of production is not, in such a case, the measure of the abstract capital vested in a productive instrument.

[1]The question may here arise whether, when the labor field is contracting, the marginal product is in reality the regulator of wages. Under these circumstances men are called from the periphery of their territory toward the centre by the prospect of better pay. Instead, then, of the recession of the margin fixing the rate

struments. They are still the "final increment" of labor because, in the new and better field that all labor is now occupying, they may literally have been the last to enter, and because they occupy the border region in which any still later comers would, in the absence of a new influx of capital, be compelled to find places.

A full presentation of this part of the subject would reveal the entire mechanism whereby the growth of capital reacts on wages. The fact that sustained the wage fund theory would be referred to its true cause. The relation of wages to capital, on the one hand, and to products, on the other, would become such in theory as it is in fact.

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of wages, does not the rate of wages determine the amount of the recession?

When the labor margin is advancing no such difficulty appears. The product of the final increment is then clearly the regulator of wages. There is a surplus of labor to be provided for; and this can be done only in the territory beyond the present margin. The new men must in any case use poorer instruments than those that are now in operation, or make less advantageous uses of good instruments. They will get what they thus create, and competition will compel other men to accept the same amount. With an advancing margin of the field of labor competition forces wages downward, and the product of the final increment of labor sets the standard below which they will not fall.

In the case of a receding margin of the field of labor competition raises wages; and the product of that, which, under these circumstances, is the final increment, sets the standard above which they will not rise. A certain number of men are called into the central areas of the labor field. This means that the use of the least productive instruments, and the least remunerative uses of good instruments, are abandoned. If, when the demand for labor in the central areas of its field has been met, wages exceed the product of what is then the final increment of labor, the abandoment of the less productive instruments, etc., will go farther. A temporary surplus of labor will be created, which, in the end, can place itself no where else than in the marginal area lately abandoned. Product at the margin of the field of labor is in both conditions a true regulator.

With the full statement of the law we should be able to estimate the indictment that socialism brings against the industrial system: "Wages rise, indeed, but not in proportion to the total increase of the income of society. The workman gets less than his *pro rata* share." If the poor are to be always with us, if coöperative experiments are to fail, and if empty-handed labor is to forever represent nearly three quarters of the human family, the sole hope of this multitude lies in an advance of the margin of the field of capital, and in the retirement of the margin of the field of labor. By this twofold action only can wages rise with great rapidity. But that movement of the margins is possible only by means of a considerable excess in the supply of capital unbalanced by labor. A large addition to the supply of capital lowers the rate of interest, but it increases the total amount of it. A man with a hundred thousand dollars is more and more straitened in his income; but the men whose fortunes are constantly assuming larger dimensions get, in spite of falling interest, greater aggregate returns. The total result to the wage earner is this: he gets absolutely more for his labor; his income rapidly gains on that of the man with a fixed amount of capital; it falls behind that of the man with a rapidly increasing capital. The forces that would reduce wages in absolute amount would cause them to represent a larger and larger proportion of the total social income. If this be justice or more than justice to the laborer, it is justice or more at the cost of suffering. The forces that raise wages cause them to represent a diminishing percentage of the social income. If this be injustice to the laborer it is an injustice that

carries with it his only chance of raising the general level of his life. There is, however, in actual fact, no conflict between the equities of the case and the utilities. The laborer will not need to secure more and more of what he needs by accepting less and less of what he earns. Where natural law can have its way the bread that he eats will not need to be "leavened with a sense of injustice."

We should know with the completion of our study of this law, whether it is true that wage earners anywhere get less than they actually produce. We started with the consideration of a theory that claims that workmen everywhere are compelled to to take what an empty-handed man can create at the margin of agricultural tillage. This man, as is said, "works under the greatest disadvantage." He creates less than men who work elsewhere; yet that minimum that he creates is the maximum that they can get. Most of the workmen are plundered.

By whom is the plundering done? Where natural law can run its full course it is not done by capitalists; for they get returns that are gauged, in exactly the same way, by the product of what, in this view, would be termed the least efficient increment of their capital. The class of entrepreneurs, indeed, remains to be considered; and it may well be that, with the artificial checks on competitive production that are characteristic of our time, particular individuals and groups within this class secure, for a time, gains that are abnormally large, and that have somewhat of the taint of plunder on them. In the nature of the case such profits cannot be realized by the employing class as a whole. Moreover, in spite of all efforts to withstand natural

forces, these act as levellers. If it can be shown, as I maintain that it can be, that, in that ideal state in which competition is theoretically perfect, the whole of the income of society that can be termed normal and permanent goes to capital and labor in the generic sense of those terms, that the pure profit of entrepreneurs is transient, and is drawn, while it lasts, from an independent addition to the product of industry, then labor may be said to get all of that normal and permanent product less a certain minimum sum that is reserved for capital. The instruments that aid labor demand for their hire only what the "least efficient" of them produces. Labor is robbed by capital in the same way that capital is robbed by labor, and in no other; for the returns of each agent are fixed in identically the same manner. Each gets an amount gauged by the product of its own final increment; and yet, on the other hand, each gets the whole of the normal and permanent product of industry, less a certain minimum sum that is reserved for the other.[1] It is as though over the entire field

[1]The characterization of the final increment of labor of capital as "least efficient" is an inaccurate use of terms. All increments are, theoretically, equally efficient. The workman A, on the margin of his field, produces, with a no-rent instrument, or by a no-rent use of a better one, a product that he takes as wages. B, one step nearer to the center of the field, creates, by the aid of appliances that represent one unit of capital, his wages plus a certain minimum sum. That sum is what one unit of capital can produce at the margin of its own field. C, aided by two units of capital, creates his wages plus what two marginal units of capital can produce; etc. In reality labor is everywhere equally efficient, as it is equally profitable; and capital is so. This, of course disregards qualitative differences among laborers; and it assumes, that the pure profit of entrepreneurs is either absent, or is the result of an independent addition to the product of industry. The supposed case is as ideal as a case must be that would illustrate the working of a single economic principle.

labor joined hands with capital, and each took what it could add to the result of the independent efficiency of the other. *Under perfect competition* the reward of each is virtually its own actual product.

To fully trace the working of the law to this point and then stop, would be to leave the subject where, by traditional standards, a study should end. We should know what would happen under perfect competition. We should have established a normal standard of wages and interest, as they might be expected to be if every workman were acting for himself, and if shops were small enough and employers numerous enough to create on their side an active competition. This is the point where distinctively modern studies begin. They trace the effect of consolidations that seek to suppress competition. Do labor unions, on the one hand, and corporations, pools and trusts, on the other, annul the principle that we have been considering? On the contrary they use it, and give to its operation an exaggerated effect. The law of marginal valuation of labor and capital appears in the strongest light when its actual operation is studied under a regime of pools and labor unions.

What is one of the present objects of a trades union? It is to erect a wall, and shut free labor out of a certain territory. It is to restrict the admission of men to a particular field of work. If such unions are numerous, and if all proceed on the restrictive principle, the outlet for a possible surplus of labor is greatly contracted. If such a surplus were to exist. it would pour into the limited area open to it, and there press its marginal limit outward with abnormal rapidity. In the end the commercial law would

assert itself; the barrier would be broken, and the laborers formerly protected by it would suffer a more than normal depression of their wages. Such is the effect, not of labor unions, but of the restrictive policy that they often pursue. On the other hand, the law of marginal valuation of labor and capital, when fully presented, places in the clearest light the necessity and the beneficence of trades unions, when their action is turned in its natural direction.

That the bad effects of restriction have not yet been experienced by labor is due to the rapid enlargement of social capital. This agent is pressing its marginal limit into less productive fields. It is now in a position to feel the effects of a restrictive policy on its side. Trusts exaggerate the effect of the law of diminishing returns as it now applies to capital. They aim to curtail production, to shut capital out of a certain territory, and turn the entire overflow of it in other directions. In the fields that it is at liberty to enter it pushes its margin rapidly outward, diminishing with unnecessary rapidity its final product, and depressing in the same degree the rate of general interest. The working of the law of marginal valuation is extremely visible under a regime of pools and trusts. To complete the study of this part of its operation would indeed be to prove by an ocular demonstration the possibility of a law of wages that will bear modern tests. Systems change; principles remain. The final test of an economic law is its capacity to continue its work through social changes.

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SUPPLEMENTARY NOTE.

The main proposition presented in the foregoing pages has many corollaries. One is that the same reasoning that is commonly employed to prove that "rent is not an element in the price of a commodity" may be made to prove, with equal conclusiveness, that wages are not an element in price.

"Cost at the margin of cultivation" is said to afford the normal standard to which the selling price of an article tends to conform. A certain amount of wheat is demanded; the best lands do not furnish it, and recourse is had to a series of grades of land, each of which is by one degree worse than that previously cultivated. Finally the needed product is secured; the last land taken into the cultivated area pays no rent, while other grades yield to their owners a rent measured by the difference between their respective products and that of the quantity of the last and poorest land that is cultivated with the same expenditure of labor and auxiliary capital.

The selling price of the wheat would remain the same if owners of the better lands were to cease to demand rent. The demand for this food material would in any case compel a resort to the poorest soil now actually in use, and the price must be such as to reward the labor and auxiliary capital employed in tilling it. In like manner the price of any article is determined by the cost of producing the last and most laboriously made portion of the

supply. If fertile land anywhere facilitates the production, the rent exacted for it does not affect the price realized for the commodity. Such, in a condensed form, is the familiar argument.

In the light of our present studies it will be quickly seen that, in so far as the law of price is concerned, there is no difference between payments for the use of land and payments for the use of other instruments of production. A part of the supply of woolen cloth is made in no-rent mills. The demand is sufficient to compel a resort to these mills; and if nothing were asked for the use of better ones, the price of the cloth would be the same as it now is. A part of the needed supply is also created by no-rent uses of good mills; and if such mills were loaned by their owners to entrepreneurs free of all charge, the price of the goods that they create would be the same as at present.

A certain difficulty with the traditional formula is now at once foreshadowed. The common method of hiring mills and machinery is by borrowing money and buying the instruments. Even if entrepreneurs have capital enough to build their mills, that, of course, does not affect the problem; since, as entrepreneurs merely, they must be regarded as borrowing from themselves, in their other capacity as capitalists. The rent of mills, etc., takes the form of interest paid to those who furnish the money with which to build them. What is true of the amount that an entrepreneur pays for the literal use of a mill is equally true of the sums that he pays for the "use of the money" with which he buys or builds one. If rent is not a price making element then interest is not so.

This conclusion, however, is neither so startling nor so important as another to which a consistent use of traditional logic leads. Our analysis has shown us that there are two primary agents of production, namely, labor and pure capital, and that in their relation to the entrepreneur these are coördinate. What the entrepreneur pays for either of these agents is as truly an element in the price making cost of commodities as is the sum that he pays for the other.

From one point of view there appears to be a final increment of the supply of many commodities that is the product of mere work unaided by capital. This is the part of the supply that is created by men who either use instruments so poor that their owners get nothing from them, or utilize good instruments in such ways that their owners get no additional rent for this supplementary use. From another point of view there is a last increment of product that is created by capital unaided by labor. Where, with no change in the number of laborers, an extra product is secured by perfecting the material mechanism of an establishment, that extra product is secured by the entrepreneur through an outlay consisting of interest only.

The last increment of the supply of many manufactured articles is now actually created by putting more and better appliances into the hands of an existing working force. In connection with this ultimate portion of the supply no wages are paid. In the present state of industry the cost of this final increment of products consists in interest only.

We are now prepared to reverse the traditional reasoning concerning the factors that determine price. The demand for commodities requires a

resort to that increment of capital that is expended in perfecting the working appliances. This is the part of the fund that, according to the traditional formula, would be said to "work at the greatest disadvantage." It may be said to be no-labor capital; it is obliged to create its product virtually without aid from the human part of the working organism. As, in the traditional formula, the demand for food is said to cause a resort to soils on which men work under the greatest disadvantage, so, in terms of our formula, the demand for many commodities may be said to compel a resort to the capital that works under the corresponding difficulty. If the part of the food supply that is created by tillers of no-rent land be selected as the portion that sets the market value of the whole, then it is made to appear that ground-rent is not an element in the price of food. Though owners of land were to ask nothing for the use of it, the price of produce would remain as it is.

Broadening the formula, we may say that if that portion of the supply of commodities of any kind that is produced by the use of no-rent instruments, or by no-rent uses of good instruments, be selected as the final or price regulating portion, then the rent of all instruments,—which is the same thing as interest on their value,—ceases to be an element in price.

Reversing the formula we may now add, with equal positiveness, that if the part of the supply of commodities that is created by no-labor capital be selected as the final or price regulating portion, then wages are not an element in price. Though the particular men who now work in coal mines and

blast furnaces were to give their services, for a time, for nothing, the price of coal and of iron should, theoretically, remain the same that it is at present. From the so-called natural price of commodities, wages are thus eliminated. What is left? In this case, interest; since that represents to the entrepreneur the entire cost of the final increment of the supply that he puts upon the market. On the other hand the mode of analysis that eliminated interest as a price making element, resolved the entire cost of what, in that view, was the final increment of the supply into wages.

The entire law breaks down under clear analysis. The cost of every part of the supply of a commodity is, in theory, one and the same. Over the entire field of industry the difficulties or "disadvantages" encountered by productive agents are in amount identical. Every part of the capital engaged tends, under theoretically perfect competition, to add to the independent product of labor and of other capital a given amount. Overlooking, of course, personal difference among workmen, in order to isolate the phenomena that we are studying, every part of the labor supply is, virtually, equally efficient, as it is equally costly to entrepreneurs. Of the various portions of the supply of a commodity some are made by unaided capital, some, from another point of view, appear as the product of unaided labor. Still other portions are created by labor and capital in varying combinations. The cost of all portions is the same. It is an indirect way, and through the action of the wages-and-interest law that we have analyzed, that marginal standards actually determine the cost of producing commodities, since it is on the

outer limit of their respective fields that the general earnings of labor and of capital are fixed.

The relation of our theory of the marginal valuation of labor and capital to Malthusianism is analagous to its relation to the wage fund doctrine. In both cases we accept a traditional conclusion, but reject the process by which it is reached. The fate of working humanity depends on the relative rates of increase of the supply of labor, on the one hand, and of that of pure capital, on the other. Essential world crowding will ensue if, in future eras, pure capital increases more slowly than at present, while population maintains its present rate of growth. As a decline in the rapidity with which capital increases is to be expected, a corresponding retardation of the growth of population is an essential condition of future human welfare. That men may not overcrowd the world, they must not in numbers outgrow their power to make it productive.

SOCIALISM IN ENGLAND.